Hearing health indicators in the State of Minas Gerais – a study by macro-region

Indicadores de saúde auditiva em Minas Gerais – um estudo por macrorregião

Abstract

Purpose: Analysis of the organization of the Hearing Health Care Network of the State of Minas Gerais in 2009 using as reference the user flow/care indicators, system management (targets), procedure configuration and reference teams. Methods: Study of quantitative and cross-sectional analytical approach, considering five core variables and nine supplementary variables to understand the organization of the Network in the health macro-regions. The data were obtained from the Outpatient Information System and through reports of the Secretary of Health of the State of Minas Gerais. A descriptive analysis of the variables was made and the Pearson correlation coefficient and Student t test were used to verify the correlation between them. Results: It was observed that among the macro-regions there was a variation in the behavior of the analyzed indicators, whereby some Hearing Health Care Units (HHCUs) seem to assume the services of other regions. Statewide, the average value of sessions of speech therapy per patient with Hearing aid (HA) in the macro-regions was 10. However, the average therapy production was lower than the average HA adaptation in most of the macro-regions. The great demand for adaptation seems to guide the organization of the services, which has favored the adaptation and not the follow-up, through personal therapy sessions. Conclusion: It is believed that the greatest challenge of the Hearing Health Care Network of the State of Minas Gerais is to strengthen the longitudinal dimension of care, mainly through a decentralized speech therapy service, in order to improve the efficiency of the services.

Keywords: Speech, Language and Hearing Science; Health Status Indicators; Program Evaluation; Public Policies; Quality Indicators; Health Care; Hearing

Resumo

Objetivo: Analisar a organização da Rede Estadual de Atenção à Saúde Auditiva em Minas Gerais, no ano de 2009, tendo como referência os indicadores de fluxo/atenção ao usuário, de gestão do sistema (meta) e configuração de procedimentos e equipes de referência. Métodos: Estudo de abordagem quantitativa, analítico transversal, que considerou cinco variáveis centrais e nove variáveis complementares, para compreender a organização da Rede nas macrorregiões de saúde. Os dados foram obtidos no Sistema de Informação Ambulatorial e por meio de relatórios da Secretaria de Estado de Saúde de Minas Gerais. Foi realizada análise descritiva das variáveis e, para verificar a correlação entre elas, utilizou-se o Coeficiente de Correlação de Pearson e o teste t de Student. Resultados: Observou-se, entre as macrorregiões, variação no comportamento dos indicadores analisados, sendo que alguns Serviços de Atenção à Saúde Auditiva (SASA) parecem assumir serviços de outras regiões. Em todo o Estado, o valor médio de sessões de terapia fonoaudiológica por paciente, com Aparelho de Amplificação Sonora Individual (AASI), nas macrorregiões, foi de 10. No entanto, a média de produção de terapia foi inferior à média de adaptação de AASI, na maioria das macroregiões. A grande demanda de adaptação parece estar orientando a organização dos serviços, que tem privilegiado a adaptação e não o acompanhamento, por meio das sessões de terapia individual. Conclusão: Acredita-se que o maior desafio da Rede seja fortalecer a dimensão de longitudinalidade do cuidado, descentralizada, principalmente, do serviço de fonoaudiologia descentralizada, propiciando maior efetividade aos serviços.

Descritores: Fonoaudiologia; Indicadores Básicos de Saúde; Avaliação de Programas e Projetos de Saúde; Políticas Públicas; Indicadores de Qualidade em Assistência à Saúde; Audição

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INTRODUCTION

According to the World Health Organization\(^1\), it is estimated that 42 million people over three years old have some type of moderate to profound hearing impairment and that 1.5% of the Brazilian population, i.e. 2,250,000 inhabitants, present some hearing impairment, in third place among all the disabilities of the country. In Minas Gerais, according to data from Census 2000\(^2\), 15% of the population reported to have some type of physical, visual, hearing or mental disability and of this total, 4% present hearing loss.

The international literature\(^3\) points out that, of the world’s population under 15 years old, approximately 62 million have some type of permanent hearing loss. Of that number, nearly two thirds (41 million) live in developing countries.

The National Hearing Health Policy, established by the Ministerial Decree No. 2073 of September 28, 2004, is a major milestone for the health in Brazil, once it starts discussions about the full and integrated attention to people with hearing impairment, users of the Single Health System (SUS). One of the purposes of this Policy is to develop strategies to promote quality of life, education, protection, health recovery and damage control. It also aims to promote comprehensive coverage in the assistance to people with hearing impairment in Brazil, ensuring universal access, equity, integrity and social control of hearing health. It also defines minimum technical criteria for the operation and evaluation of the Hearing Health Care Units\(^4\).

Based on this policy, the State Department of Health of Minas Gerais implemented the hierarchical and regionalized Hearing Health Care Network, with full and personal assistance to people with hearing impairment, realized by the Hearing Health Care Units and other assistance points: Decentralized Speech Therapy (Municipal Department of Health/Primary care), Board of Micro-regional Hearing Health, Hearing Health Regulatory Board, Neonatal Hearing Screening Reference Services and Cochlear Implant Services. In 2009, there were 12 accredited Hearing Health Services, seven of high complexity and five of medium complexity\(^5\).

The evaluation of the time for implementation of this policy is essential to understand the progress and challenges of the Network, supporting the management in order to promote quality care for a greater number of users of the Single Health System - SUS\(^6\). In addition, the evaluation should be seen as an instrument of change, being essential to incorporate it in the routines in the of SUS management bodies\(^7\). In this sense, it is necessary to provide evidence for effective standards of practices in order to justify the application of resources.

People with hearing impairments attend the Hearing Health Services aiming at improvement of their hearing function and also their communicative performance. When treatment is offered, such as the adaptation of the hearing aid (HA) and/or rehabilitation service, the effectiveness of this treatment needs to be examined from all angles\(^8\,9\).

The evaluation of the care management, considering its various dimensions - from the individual to the social - should be able to point, not only the expected results (“hard” indicators), but also reveal the processes created and produced in all dimensions of care. This evaluation proposal goes beyond the comprehension of the structure, processes and outcomes\(^10\) as it reveals the complexity and heterogeneity of its “subject” passing by the internality and externality\(^11\) in all its dimensions. While it is essential to understand such aspects from the point of view of the SUS management, monitoring and evaluation of changes provide immediate answers to managers for the definition of intervention strategies. The construction of a health indicator panel that covers demands, resources, process, products and outcomes is also pointed out as a way to incorporate the evaluation in the health management\(^12\), as well as other strategies such as those that include teaching, learning and work, or that use quantitative and qualitative approaches, from the perspective of the health care network focused on user movement among the care points\(^13\). In this case, it is more advantageous to start the evaluation by the quantitative approach, in view of the availability of data in the information systems\(^13\).

In the specialized literature in Speech Therapy\(^14\), the benefits and user satisfaction regarding the use of hearing aid (HA) are studied as a mean to evaluate the results of this intervention. However, only this kind of analysis is not sufficient for the assessment of the quality of the hearing health services, being essential to assess the performance of the health services in relation to effectiveness, access, efficiency, respect for the law, among others\(^15\).

Given the epidemiological relevance of the hearing impairment, of its impact on the quality of life of the population and the recent organization of the Hearing Health Services, it is necessary to characterize the Hearing Health Network of the State of Minas Gerais, regarding the aspects related to the structure and results achieved. Thus, it is expected to provide input to the planning, monitoring and evaluation of the service currently offered.

The purpose of the present study was to analyze the organization of the Hearing Health Care Network of the State of Minas Gerais in 2009, having as reference the indicators of user flow/care, system management (targets), procedure configuration and reference staff.

METHODS

This study is part of the project “Evaluation of the implementation of the hearing health care network: a case study of the micro-regions of Sete Lagoas and Curvelo, Minas Gerais”, funded by the Foundation for Research Support of the State of Minas Gerais (FAPEMIG) and approved by the Research Ethics Committee of the Federal University of Minas Gerais (UFMG) (ETIC 186-10).
It is a quantitative, retrospective and cross-sectional research of analytical nature, in which the behavior of the selected variables is verified from January to December 2009.

The analysis unit adopted in this work was the health macro-region according to the Master Plan for Regionalization of Minas Gerais (PDR)\(^\text{[16]}\), although the Hearing Health Network (RESA-MG) has particularities regarding the organization of regional health services in the territory (Figure 1). The methodological choice was made to allow greater comparability of this study, since the PDR is part of the organizational guideline of regionalization of the Single Health System\(^\text{[17]}\).

The Hearing Health Network of the SES-MG had, in 2009, 12 Hearing Health accredited Services, authorized by the Ministry of Health, distributed in the State according to the Master Plan for Regionalization (Figure 1).

Of the 12 Hearing Health Care Units (HHCU) existing in 11 macro-regions in 2009, five were of medium complexity and seven of high complexity. It is highlighted that the two high complexity units of the South region were analyzed together and that the two macro-regions that did not have implemented HHCU (South Center and South Triangle) have sent patients to the Southeast and North Triangle macro-regions, respectively.

**User flow in the Hearing Health Care Network of the State of Minas Gerais**

The RESA-MG has several care points, organized in a hierarchical and regionalized way. The entrance door is the Decentralized Speech Therapy Service (FD), or Technical Reference in Hearing Health of the municipality of origin, except for neonates, whose first contact is in the Network in the Neonatal Hearing Screening Reference Service (SRTAN). The FD receives the user, referencing him, if necessary, for a basic hearing evaluation, preferably performed in the Micro-regional Hearing Health Board. If this user is classified as a candidate to the use of Hearing aid - HA, the Micro-regional Board sent him to the Hearing Health Regulatory Board, which provides the scheduling in the reference Hearing Health Care Unit (HHCU) according to the clinic priorities of the queue. In the HHCU, consultations with interdisciplinary staff, supplementary examinations, selection and adaptation of the HA and referral for Cochlear Implant surgery are realized when necessary. Then, the user is counter-referred to the Decentralized Speech Therapist, who will make the follow-up through individual sessions of speech therapy and/or auditory monitoring (Figure 2). The Decentralized Speech Therapy according to the deliberation CIB-SUS/MG No. 485, of November 19, 2008, aims to receive and rehabilitate the users of the Hearing Health Network in their municipality or referenced municipalities (Figure 2).

![Figure 1. Municipalities seat of the Hearing Health Care Units](source: State Department of Health of Minas Gerais)

![Figure 2. User flow in the Hearing Health Care Network in the State of Minas Gerais](source: CIB-SUS/MG Deliberation No. 464 of July 17, 2008, and CIB-SUS/MG Deliberation No. 485 of November 19, 2008)
Five explanatory variables guided the description of the Network, called here as core variables due to their direct relation with the flow of patients between the main care points, acting, thereby, as indicators. Nine other variables, called supplementary, related to these indicators, were analyzed in order to contribute to better understanding and description of the operation of the Network. For the calculation of these variables, the procedures recorded and available in the Outpatient Information System (SIA) were considered (Table 1). It is noteworthy that the SRTAN was not analyzed because it has no data available in the Outpatient Information System (SIA), once the Neonatal Hearing Screening Program in Minas Gerais is funded only by the state treasury, therefore, this procedure is not registered in this national database.

The data were compiled in Excel 2007 spreadsheet and analyzed by the statistical analysis software SPSS, version 16. For the descriptive analysis, the minimum and maximum, average and standard deviation values were used in the health macro-regions, in addition to the absolute value observed in the State of Minas Gerais. The Pearson Correlation Coefficient was used to verify the correlation between the variables and the Student’s t test, considering a confidence interval of 95% and a significance level of 5%.

**RESULTS**

Initially, proceeding to the analysis of the variables that describe the configuration of the reference units and teams of the Network, it is observed that, in health macro-regions, there were on average 71.8% of the micro-regions with Hearing Health Board and 38.2% of the municipalities with decentralized and certified speech therapists (Table 1).

Regarding the system management, the State Network had, in 2009, 13,800 medium and high complexity targets, which would allow the entry of approximately 0.7 new patients per 1000 inhabitants in the entire State. However, it was observed that this number significantly varied among the macro-regions, and could reach 2.8 new patients/1000 inhabitants in the Jequitinhonha region, which reference municipality is the city of Diamantina.

| Chart 1. Description of core and supplementary variables used in the study |
|---|---|---|---|
| Variables | Definition | Calculation formula and source | Calculation considering the procedure codes in the outpatient information system |
| **Core variables** | | | |
| Audiological evaluation for hearing impairment diagnostics | Refers to the number of evaluations made at HHCU, of those patients eligible to receive HA. These evaluations correspond to the two procedures performed with users of all age groups (younger and older than 3 years old) | N° of tests | = 021107009-2 + 021107010-6 |
| Individual speech therapy | N° of individual sessions of speech therapy conducted. These sessions are indicated after the HA adaptation and should be preferentially performed with the decentralized speech therapist. However, it should also be performed at HHCU at the beginning of the therapeutic process | N° of sessions | = 030107011-3 |
| Pure-tone audiometry (except those made during the hearing valuation in the HHCU) | N° of tests of Pure-tone audiometry performed only as auditory screening and classification of the patient to receive or not the HA | (N° of tests of Pure-tone audiometry - number of audiological evaluation tests for diagnosis of hearing impairment) | = 021107004-1 - (021107009-2 + 021107010-6) |
| Hearing aid (HA) | N° of hearing aids adapted in the patients. The adaptation occurs in the reference HHCU of each health macro-region | N° of adapted HA | = (070103012-7 + 070103013-5 + 070103014-3 + 070103003-8 + 070103004-6 + 070103005-4 + 070103006-2 + 070103007-0 + 070103008-9 + 070103009-7 + 070103010-0 + 070103011-9 + 070103001-1 + 070103002-0) |

Medium and high complexity targets per 1,000 inhabitants | The medium and high complexity targets were defined by the Ministry of Health and distributed by the SES-MG in the territory. Therefore this variable considers the distribution of the targets in relation to the population in the region | [N° of targets / population of the region] x 1000 | Not applied |

Source: SIA/DATASUS
### Chart 1. Description of core and supplementary variables used in the study (cont.)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition</th>
<th>Calculation formula and source</th>
<th>Calculation considering the procedure codes in the outpatient information system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplementary variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nº of individual sessions of speech therapy per adapted patient</td>
<td>Nº of individual sessions of speech therapy conducted per patient that received the HA</td>
<td>[Nº of sessions of speech therapy/ (nº patients)] * The number of adapted patients was calculated considering that each patient receives on average two HA</td>
<td>= [(030107011-3)/(070103012-7 + 070103013-5 + 070103014-3 + 070103003-8 + 070103004-6 + 070103005-4 + 070103006-2 + 070103007-0 + 070103008-9 + 070103009-7 + 070103010-0 + 070103011-9 + 070103001-1 + 070103002-)2]]</td>
</tr>
<tr>
<td>Effectiveness Index of the Basic hearing evaluation</td>
<td>Index created by the researchers that reflects the effectiveness of the basic hearing evaluation with regard to the flow of patients between the care points. For this, it was considered that this assessment should be able to sort those users with hearing impairment and that have profile to receive HA and, therefore, should be submitted for detailed examination in the reference HHCU</td>
<td>[Nº of audiological evaluations for diagnostics of hearing impairment / (Nº of adapted patients *)]</td>
<td>= [(021107009-2 + 021107010-6) / ((070103012-7 + 070103013-5 + 070103014-3 + 070103003-8 + 070103004-6 + 070103005-4 + 070103006-2 + 070103007-0 + 070103008-9 + 070103009-7 + 070103010-0 + 070103011-9 + 070103001-1 + 070103002-)2]]</td>
</tr>
<tr>
<td>% of the reference JSAM for the HHCU, certified</td>
<td>Refers to the number of certified JSAM in its macro-region in relation to the total referenced micro-regions in that macro-region</td>
<td>[Nº of certified JSAM/number of referenced micro-regions]</td>
<td>Not applied</td>
</tr>
<tr>
<td>% FD they refer to the HHCU, certified</td>
<td>Refers to the number of certified and decentralized speech therapists in a given municipality in relation to the total number of municipalities in the referenced macro-region</td>
<td>[Nº of certified FD/number of referenced municipalities]</td>
<td>Not applied</td>
</tr>
<tr>
<td>Working hours</td>
<td>Refers to the weekly working hours of the professionals working in the medium and high complexity HHCU. These working hours were reported by the professionals themselves. Corresponding to four variables: working hours of the ENT specialist, Speech therapist, Psychologist and Social Worker</td>
<td>Nº of hours per week</td>
<td>Not applied</td>
</tr>
<tr>
<td>Pure-tone audiometry</td>
<td>Number of tests of pure-tone audiometry. These tests may occur in the municipality with Decentralized Speech Therapy in the JMSA or other accredited health services. This test can also be counted among the audiological evaluations in the HHCU</td>
<td>Nº of tests</td>
<td>= 021107004-1</td>
</tr>
</tbody>
</table>

When comparing the number of targets with the number of new patients received, it was found that the Network would be able to assist 2969 new patients more in the assessed year. By means of the Student's t test, it was found that this difference in the macro-regions is statistically significant (t= -3.797, p=0.04; IC=111.5; 428.3).

Considering the user flow/care indicators, it was noted that the macro-regions Jequitinhonha, South East, Northwest, and West had greater similarity regarding the behavior of the following variables: medium and high complexity targets, hearing impairment diagnostic evaluation and number of patients who received hearing aid. Regarding the variables diagnostic evaluation and adaptation of HA, which compose the index of effectiveness of the basic hearing evaluation, it was observed that in the East, Northeast, South and North Triangle macro-regions, the number of evaluations was higher than the number of patients that received the hearing aid in comparison with other geographical regions (Figure 3).

Regarding the number of patient assessments, the East, Northeast, Southeast and Southern macro-regions had a higher number, where the number of evaluated patients also showed a significant difference regarding the number of adapted patients.
Table 1. Summary of measures of quantitative variables analyzed in the study in Minas Gerais and in the health macro-regions in 2009

<table>
<thead>
<tr>
<th>Description</th>
<th>Value Minas Gerais</th>
<th>Number of macro-regions</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
<th>IC</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly working hours - ENT specialist (hours/week)</td>
<td>310</td>
<td>6 (HC)*</td>
<td>24</td>
<td>60</td>
<td>32.5</td>
<td>(18.02; 46.98)</td>
<td>5.631</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (MC)**</td>
<td>8</td>
<td>55</td>
<td>28.75</td>
<td>(-7.15; 64.65)</td>
<td>11.28</td>
</tr>
<tr>
<td>Weekly working hours - Speech therapist (hours/week)</td>
<td>1906</td>
<td>6 (HC)*</td>
<td>66</td>
<td>392</td>
<td>225.33</td>
<td>(98.65; 352.01)</td>
<td>5.631</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (MC)**</td>
<td>66</td>
<td>172</td>
<td>110.8</td>
<td>(60.62; 160.98)</td>
<td>18.073</td>
</tr>
<tr>
<td>Weekly working hours - Social Worker (hours/week)</td>
<td>217</td>
<td>6 (HC)*</td>
<td>0</td>
<td>40</td>
<td>22</td>
<td>(6.84; 37.13)</td>
<td>5.887</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (MC)**</td>
<td>7</td>
<td>25</td>
<td>17</td>
<td>(5.93; 28.07)</td>
<td>3.987</td>
</tr>
<tr>
<td>Weekly working hours - Psychologist (hours/week)</td>
<td>140</td>
<td>6 (HC)*</td>
<td>0</td>
<td>20</td>
<td>12.166</td>
<td>(2.82; 21.515)</td>
<td>3.637</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 (MC)**</td>
<td>8</td>
<td>20</td>
<td>13.4</td>
<td>(6.85; 19.95)</td>
<td>2.358</td>
</tr>
<tr>
<td>Average number of HA suppliers with contract</td>
<td>36</td>
<td></td>
<td>9</td>
<td>2</td>
<td>5</td>
<td>(3.39; 4.79)</td>
<td>0.315</td>
</tr>
<tr>
<td>Pure-tone audiometry</td>
<td>39.992</td>
<td>13</td>
<td>92</td>
<td>14.756</td>
<td>3497.64</td>
<td>(873.70; 6121.5)</td>
<td>1177.63</td>
</tr>
<tr>
<td>Pure-tone audiometry (except those made during the basic hearing valuation)</td>
<td>24.760</td>
<td>11</td>
<td>-229</td>
<td>13.509</td>
<td>2115.18</td>
<td>(-487.68; 4718.0)</td>
<td>1168.17</td>
</tr>
<tr>
<td>Audiological evaluation for hearing impairment diagnostics</td>
<td>15.232</td>
<td>12</td>
<td>25</td>
<td>3905</td>
<td>1269.33</td>
<td>(664.41; 1872.2)</td>
<td>273.93</td>
</tr>
<tr>
<td>Individual speech therapy (annual)</td>
<td>129.157</td>
<td>12</td>
<td>2975</td>
<td>24.527</td>
<td>10058.55</td>
<td>(4892.91; 15134.18)</td>
<td>2277.97</td>
</tr>
<tr>
<td>No. of individual sessions of speech therapy per adapted patient (annual)</td>
<td>11.92</td>
<td>11</td>
<td>5.44</td>
<td>19.62</td>
<td>9.91</td>
<td>(6.5; 13.31)</td>
<td>1.527</td>
</tr>
<tr>
<td>Hearing aid – HA (annual)</td>
<td>21.662</td>
<td>11</td>
<td>972</td>
<td>4.985</td>
<td>1969.27</td>
<td>(1215.30; 2723.2)</td>
<td>338.38</td>
</tr>
<tr>
<td>Effectiveness Index of basic hearing evaluation</td>
<td>1.406</td>
<td>11</td>
<td>1</td>
<td>2.358</td>
<td>1.435</td>
<td>(1.118; 1.752)</td>
<td>0.143</td>
</tr>
<tr>
<td>Annual medium and high complexity targets per 1,000 inhabitants (annual)</td>
<td>0.689</td>
<td>11</td>
<td>0.217</td>
<td>2.793</td>
<td>1.086</td>
<td>(0.659; 1.513)</td>
<td>0.191</td>
</tr>
<tr>
<td>% of reference JSAM for accredited HHCU</td>
<td>62.67%</td>
<td>11</td>
<td>30</td>
<td>100</td>
<td>71.82</td>
<td>(56.7; 86.94)</td>
<td>6.785</td>
</tr>
<tr>
<td>% of accredited decentralized speech therapists</td>
<td>27.55%</td>
<td>11</td>
<td>33</td>
<td>76</td>
<td>38.18</td>
<td>(22.11; 54.26)</td>
<td>7.215</td>
</tr>
</tbody>
</table>

Source: DATASUS and State Department of Health of Minas Gerais
* Medium complexity Hearing Health Care Unit; ** High complexity Hearing Health Care Unit
*** The macro-regions that had information on each one of the variables were considered. In addition, only the 11 macro-regions that had the Hearing Health Care Unit in 2009

Note: HC = high complexity, MC = medium complexity

The greatest difference between the evaluated patients and patients with hearing aid was found in the Southern macro-region. This same behavior could be observed between the hearing evaluation variables for hearing loss diagnostic, number of adapted HA and number of medium and high complexity targets (Figure 3) in the health macro-regions and in the statistically significant correlation found (Table 2).

It is noteworthy that in the Southern macro-region there were two high complexity HHCU’s, and it was expected that the total production of this macro-region would be the double of other macro-regions that only had one high complexity HHCU.

Also with respect to the user care of the Network, 24,760 tests of limiar tonal audiometry were performed in Minas Gerais, exclusively for the detection of hearing impairment and identification of the need for adaptation of HA, with subsequent referral to the reference HHCU (Table 1). To verify the effectiveness of the classification of the patients as candidates to receive the adaptation after the completion of the basic hearing evaluation, the effectiveness index was created for the of basic hearing evaluation (Table 1), which should be as near as possible of the unity value, since it is expected that all users who underwent complete hearing evaluation in the HHCU actually have profile for receiving the HA. The Index in Minas Gerais and its average value in the macro-regions reached values close to 1.4, which is roughly 40% above the ideal (Table 1).
In addition, it was not possible to identify a statistically significant correlation between the variables of hearing evaluation for diagnostic of hearing loss and HA (Pearson correlation coefficient of -0.3 and p=0.931).

Statewide, approximately 12 sessions of individual speech therapy for each adapted patient were realized and the average value of the macro-regions was approximately ten sessions, reaching 19 in the Southeast macro-region (Table 1). To verify if the hearing rehabilitation was taking place in a decentralized manner in the municipalities, or if they were still occurring mainly in the HHCUs, the correlation between the working hours of the speech therapist in the Hearing Health Care Unit (or HHCU) and the number of individual sessions of speech therapy was verified. It was found, in a significant statistically way, a strong correlation (Pearson correlation coefficient of 0.884 and p=0.000) between these two variables, since the variation of the monthly average number of sessions of speech therapy and the number of distributed HAs occurred concomitantly in most regions (Figure 4). This suggests that, possibly, the speech therapy is still occurring in the references of the macro-regions and not in a decentralized manner as provided for in the Network design.

Regarding the adaptation of the hearing aids, it was observed a high number in the Southern macro-region in relation to other macro-regions of the State. However, the average production of speech therapy did not follow the average of HA adaptation. It was found that, in macro-regions without HHCU (South Center and South Triangle); there was a production of speech therapy.

**DISCUSSION**

The analysis of the organization of the Hearing Health Care Network in the State of Minas Gerais, in 2009, showed variation in the behavior of the analyzed indicators, namely:
user flow/care, system management (targets) and procedure configuration, and reference staff in relation to accredited Hearing Health Services.

The fact that the Southern macro-region presented greater difference between the number of diagnostic evaluations in relation to the number of medium and high complexity targets, may be based on Article 4th of the deliberation CIB-SUS/MG No. 464\(^{(19)}\), which provides for the revision of the targets/physical quotes for accredited medium and high complexity hearing health care units, when necessary, according to operational and logistical convenience. However, this procedure of undertaking services from other regions may indicate the deficiency of the strategy used to achieve the care integrity, or that this difference is due to the lack of infrastructure to meet the entire demand of hearing aid adaptation.

Although this study found a significant correlation between medium and high complexity targets, diagnostic evaluation of hearing impairment and adaptation of hearing aids in health macro-regions of Minas Gerais in 2009, the hearing rehabilitation process was below expectations in relation to the number of people adapted with HA. It is known that the hearing loss rehabilitation process involves a much broader work, which provides for the continuous flow HA adaptation, with medical and speech therapy follow-up, both for adjustments as for periodic inspections of the technical conditions and the benefit obtained with the use of such equipment, as well as social and psychological assistance\(^{(20)}\).

It is not sufficient to assist the patient only at the time of purchase of the hearing aid. The lack of follow-up has consequences, since the non-effective use of the hearing aid compromises the social integration\(^{(21,22)}\). Thus, the realization of speech therapies for the follow-up of patients adapted with HA is essential in order to integrate the patient in the communication process, in social life and in the psychological and professional dimensions.

Among the professionals involved in the HA selection and adaptation process are the ENT specialists, mainly responsible for the diagnosis, and the speech therapists, whose primary role is the habilitation or rehabilitation of people with hearing loss\(^{(23)}\). For the American Speech-Language Hearing Association (ASHA)\(^{(24)}\) the speech therapist is responsible for the rehabilitation of the social function of hearing, since this professional addresses the practical utility of the hearing ability in order to increase the ability of the individual with hearing impairment to deal with daily life situations. Such statements may explain why the weekly working hours of the Speech therapist was higher than of other professionals (ENT specialist, Psychologist and Social Worker) in this study. Thus, the speech therapist becomes responsible for a great part of the management of the user care of the Hearing Health Services, as well as by the proposition of rehabilitation programs aimed at the social inclusion of the hearing impaired\(^{(24,25)}\).

The Ministerial Decree No. 2073, 2004, SAS No. 587 Annex I\(^{(42)}\), states that the Hearing Health actions must occur from the Basic Care to high complexity services, including actions to promote hearing health, prevention and early identification of hearing problems with the community, as well as informative and educational actions, family counseling and referrals, when necessary, for the Service Hearing Health Care Unit.

This same document defines the activities that the staff should develop in Medium Complexity Hearing Health Care Unit: hearing screening and monitoring of neonates, preschool and school children, diagnosis, treatment and rehabilitation of hearing loss in children from 3 years old, youth, adults, including workers and elderly, respecting the specificities of evaluation and rehabilitation required for each of these segments, besides the qualification of the assistance and foster the continued education of the health professionals involved in the implantation and implementation of the Hearing Health Care Policy, in accordance with the principles of comprehensiveness and humanization\(^{(41)}\).

In the selection and adaptation process of the hearing aid, the success of the adaptation is related to the guidance and counseling work. However, the professional needs to know the real difficulties of the patients regarding the appropriate use of the amplification\(^{(26)}\). Thus, the therapy sessions will allow evaluations and developments of strategies for the effective use of HA.

In the study, it was observed that the average production of therapy is well below the average of HA adaptation, except in two of the macro-regions: South Center and South Triangle that performed speech therapies even without the existence of HHCU. It is noteworthy that the hearing health reference service in the Southern macro-region exceeded the number of HA adaptations, reaching a monthly average of 5000. This corresponds to 100% more than in the second region with the largest distribution, Southeast macro-region. Nevertheless, the monthly average of individual speech therapy in the Southern macro-region has not reached 2000. Some hypotheses can be raised to explain this result, including: the great demand for adaptation is the reason why the services privilege the delivery and not the follow-up; the distance between the residence of the patient and the service hinders the access to the therapy, the coverage for the therapy is being neglected and there is not sufficient engagement of decentralized speech therapists in the municipalities of residence of the patients to ensure the therapy, not occurring in a decentralized manner in the regions.

In addition to this variation of the number of sessions of speech therapy among the macro-regions and its possible realization in a concentrated way in the HHCU, a study indicates the need to understand the factors related to the behavior of this rehabilitation process in the Network. This is because the HA adaptation, essential for the full development of the individual with hearing loss, does not depend on the rehabilitation to minimize the difficulties related to hearing loss. Thereby, the purpose of the
speech therapy is to encourage the effective use of hearing aids and of strategies that facilitate the individual’s performance in communication, with the maximum possible use in each acoustic context\(^{(27)}\). The literature also points out that auditory training has positive effects on HA adaptation\(^{(27,28)}\), which confirms the importance of this care step in the Network flow.

Regarding the Southern macro-region, which has two HHCU, a hypothesis for the large number of adaptations would be the easy access for the user, i.e., there are no barriers that prevent reaching the service and there is facility for the diagnosis, encouraging the user to enter in these services. In the region of higher population concentration there is only one HHCU. In this case, it is worth remembering the literature\(^{(29)}\) that states that when the user meets barriers that prevent his entry in a public service, he finds alternate streams to reach the service.

The health services of the public network should establish guidelines for the development of diagnostic programs, acquisition and adaptation/delivery of hearing aids and especially hearing reeducation for the hearing impaired, in order to enable them to participate and enjoy their social relationships, keeping a good quality of life\(^{(29,30)}\). It must also be highlighted that this study showed progress and challenges of network indicators of HA user care in a State that relies on the implementation of the hearing health policy throughout its territory. Despite the contributions of the study, some limitations were observed, such as the management of secondary data, which did not allow further analysis of the findings and the realization period, very close to the implementation of the policy in the SES-MG, 2009.

**CONCLUSION**

In this study, the organization of the hearing health network in the State of Minas Gerais was discussed, with reference to care flows, system management and procedure ordering. It may be considered relevant as it contributes to the advancement of the investigation in the area.

It is believed that the greatest challenge of the Hearing Health Care Network in Minas Gerais is to strengthen the longitudinal dimension of care, which must occur in a decentralized manner, so as to provide greater efficiency of the service and contribute, in a more effectively way, to the improvement of the quality of life of the population with hearing impairment. The evidences listed in this study also refer to the need of new strategies for the follow-up and evaluation of public policies, considering health information systems as important tools for management and planning.

**REFERENCES**


